

# Neurosurgery

## Glasgow Coma Scale:

Eye opening		Verbal Response		Best Motor response	
Spontaneous	4	Oriented	5	Obeys commands for movement	6
To verbal stimuli	3	Confused but answers questions	4	Purposeful movement to painful stimulus	5
To pain only	2	Inappropriate words	3	Withdraws in response to pain	4
No response	1	Incomprehensible speech	2	Flexion to pain (decorticate rigidity)	3
		No response	1	Extension to pain (decerebrate rigidity)	2
				No response	1

## Head Injury Classification:

- Severe Head Injury → score of 8 or less
- Moderate Head Injury → score of 9 to 12
- Mild Head Injury → score of 13 to 15

## Extradural hematoma: (Middle meningeal artery Injury)

### Etiology:

1. Without skull fracture: in children as they have elastic skull
2. With fracture of temporal or parietal bone → dura is driven inwards → tear of underlying middle meningeal A or V → blood accumulates in extradural space.

### Source of bleeding:

- 1-Middle meningeal artery, especially the anterior branch (most common)
- 2-Venous sinuses: profuse hemorrhage (serious)
- 3-Diploic hemorrhage: minimal

### Clinical Picture:

#### a) Stage of Concussion:

- 1-Immediate loss of consciousness after trauma
- 2-Vital signs: weak rapid pulse- ↓ ABP - shallow slow respiration - subnormal temperature
- 3-Limbs: cold skin - relaxed muscles - lost reflexes
- 4-Eyes: equal reactive pupils

#### b) Stage of lucid interval:

- Period of recovery from coma of concussion followed by coma of compression.
- Patient regains his consciousness for hours (enough time to form a large hematoma → compression)

#### c) Stage of compression:

##### **1-Early compression (Irritation)**

- Gradual progressive deterioration of level of consciousness (confusion progresses to drowsiness)
- Focal signs of irritation: due to compression on brain areas e.g. convulsions on contralateral side
- Vital signs irritation: Hypothermia, bradycardia, hypertension, slow deep respiration
- Pupils: constricted on the same side of compression

##### **2-Late compression: (Paralysis)**

- Deteriorated level of consciousness: gradually to coma with lost reflexes
- Focal signs of paralysis: e.g. hemiplegia on opposite side of the body
- Vital signs: Fever, rapid irregular pulse, hypotension, rapid irregular respiration followed by *Cheyne-Stokes respiration* (alternating cycles of deep & shallow resp. with possible periods of apnea)
- Pupils: dilated and fixed on same side of compression.

##### **3-Terminal compression:** -Decerebrate rigidity and bilateral dilated fixed pupils

### Complications:

#### a) Early: 1-Intracranial hemorrhage 2-Brain edema 3-Dural tear 4-Carotid cavernous fistula

5-Intracranial infections 6-Traumatic paralysis of cranial nerves 7-Associated spinal injuries

#### b) Late: 1-Posttraumatic Headache - epilepsy - hydrocephalus 2-Skull defects

3-Aneurysm formation 4-Traumatic meningo-encephalocele 5-Chronic subdural hematoma

**Management:****1-Primary survey:**

-ABCDE

**2-Secondary survey:**

-Head to toe examination

-Monitoring

-Investigations:

▪CT: (biconvex lesion) ▪Plain X-ray: skull, chest &amp; spine ▪Lab

**3-Definitive treatment:**

-Urgent evacuation via craniotomy through trephine or burr hole

-Control of the bleeding:

▪Middle meningeal a.: acc. to site

\* In foramen spinosum: by sterile match plug.

\* Within dura mater: by under-running suturing of artery.

\* In bony tunnel by bone wax plug or by crushing bony canal over the artery.

▪Diploic vessels: by bone wax plug or by crushing bone by bone crushing forceps.

▪Venous sinus in rigid wall of dura: by suturing the tear (if narrow) or by grafting (if wide).

**D.D. of acute extradural from acute subdural hematoma**

	Acute Extradural Hematoma	Acute Subdural Hematoma
Trauma	usually mild	Severe
Brain damage	usually mild	Severe
Lucid interval	usually present	No
Bi-laterality	usually unilateral	Commonly bilateral
Investigations	CT → biconvex	CT → crescentic
Result of surgery	successful if early	Mortality up to 50%

**How to determine the side of trauma?** (Signs of lateralization)**a) Clinical:**

1-The same side of external trauma - initial constriction &amp; dilatation of pupil - Skull # in x-ray

2-The contralateral side of convulsions &amp; hemiplegia

**B) Investigations:** CT (investigation of choice)**Causes of Low back pain:****A) Mechanical:** (97%)

1-Lumbar strain or sprain 2-Degenerative disk or facet process

3-Herniated disk 4-Osteoporotic compression fracture

5-Spinal stenosis 6-Spondylolisthesis

7-Vertebral fracture

**B) Non-Mechanical:**

-Spinal: 1-Inflammatory spondyloarthopathy 2-Neoplasia 3-Infections

**C) Referred Pain from Visceral organs:**

▪Urologic: 1-Prostatitis 2-Nephrolithiasis 3-Pyelonephritis

▪Gynecological: 1-Endometriosis 2-Uterine prolapse 3-Chronic cervicitis 4-PID

▪Metabolic: 1-Osteoporosis 2-Diabetic neuropathy 3-Gout 4-Paget's disease

▪Miscellaneous: 1-Aortic aneurysm 2-Pancreatitis 3-Cholecystitis 4-peptic ulcer

5-Psychogenic and fibromyalgia 6-Smoking 7-Pregnancy 8-Obesity

9-Poor posture and poor sleeping position

## **Management of Depressed Skull Fracture:**

**A) Simple (closed) depressed fracture:** in infants or children

-Either pond smooth type or gutter intended type. -Rarely, causes cerebral compression.

-**Treatment:** tends to correct itself with growth, but surgery is indicated if:

1. Depressed segment in temporal region i.e. over speech or motor area or in forehead of infant failing to correct itself within 6 weeks or overlying air sinus.
2. Sharp spicules in inner table → possible dural tear or epilepsy → brain damage.
3. Large depressed segment more than one inch.

**B) Compound depressed fracture:** with lacerated scalp wound:

**Clinical picture:**

- 1-History of trauma
- 2-Pain & Swelling
- 3-May be associated with profuse bleeding, CSF leakage or prolapse of brain matter.

**Treatment:**

a) **Primary survey:** ABCDE

b) **Secondary survey:**

- Head to toe examination
- Local examination of the wound to exclude CSF leakage or brain matter herniation
- Monitoring
- Investigations: ▪CT: (exclude any associated intracranial problems) ▪Plain X-ray ▪Lab

c) **Definitive treatment:**

- 1-Elevation of the depressed fragment
- 2-Repair of any dural tear
- 3-Removal of any loose fragments
- 4-Management of any associated intracranial lesion
- 5-Suturing the scalp to cover the brain
- 6-Start of prophylactic antibiotics

\*If the depressed bone is comminuted → cranioplasty is performed

\*CSF leakage & brain herniation is an indication for urgent surgical intervention

## **Indications for Disc Surgery:**

**a) Absolute:**

(**Cauda Equina Syndrome**) manifested by

- Weakness of the muscles (or paralysis) of the lower extremities
- Numbness & sensory loss -Loss of reflexes - Bowel incontinence
- Detrusor weaknesses causing urinary retention and post-void residual incontinence
- Inability to stand or walk

**B) Relative:**

- 1- Neurological deficit (Loss of motor function) e.g. foot drop
- 2- Persistent intractable pain altering quality of life e.g. Sciatica (in L.L.) and Radiculopathy (in UL)
- 3- Failed 6 weeks of conservative non-operative treatment

## **Causes of Congenital Hydrocephalus:**

- 1-Intraventricular matrix hemorrhages in premature infants
- 2-Type II Arnold-Chiari malformation
- 3-Aqueduct of Sylvius atresia and stenosis
- 4-Dandy-Walker malformation.
- 5-Congenital ependymal cysts
- 6-Congenital tumors e.g. craniopharyngiomas and teratomas
- 7-Aneurysmal dilatation of the vein of Galen
- 8-Intrauterine Infections